



SEQUENCE LISTING

- <110> Dalemans, Wilfried L.J.
Gerard, Catherine Marie Ghislaine
- <120> Compositions Comprising Human Papilloma Virus Proteins
and Fusion Proteins Adjuvanted with a CpG Oligonucleotide
- <130> B45124
- <140> 09/581,976
<141> 2000-06-20
- <150> PCT/EP98/08563
<151> 1998-12-18
- <150> GB 9727262.9
<151> 1997-12-24
- <160> 28
- <170> FastSEQ for Windows Version 3.0
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<223> Chimaeric protein (protein D from Haemophilus
influenzae B and E7 from Human papilloma virus type
16)

<400> 1

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Ser	Asp	Lys	Ile	Ile	Ile	Ala	His	Arg	Gly	Ala	Ser	Gly	Tyr	Leu	Pro
			20					25					30		
Glu	His	Thr	Leu	Glu	Ser	Lys	Ala	Leu	Ala	Phe	Ala	Gln	Gln	Ala	Asp
			35				40					45			
Tyr	Leu	Glu	Gln	Asp	Leu	Ala	Met	Thr	Lys	Asp	Gly	Arg	Leu	Val	Val
	50				55						60				
Ile	His	Asp	His	Phe	Leu	Asp	Gly	Leu	Thr	Asp	Val	Ala	Lys	Lys	Phe
65					70					75					80
Pro	His	Arg	His	Arg	Lys	Asp	Gly	Arg	Tyr	Tyr	Val	Ile	Asp	Phe	Thr
				85					90					95	
Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met
			100					105					110		
Ala	Met	His	Gly	Asp	Thr	Pro	Thr	Leu	His	Glu	Tyr	Met	Leu	Asp	Leu
		115					120					125			
Gln	Pro	Glu	Thr	Thr	Asp	Leu	Tyr	Cys	Tyr	Glu	Gln	Leu	Asn	Asp	Ser
	130					135					140				
Ser	Glu	Glu	Glu	Asp	Glu	Ile	Asp	Gly	Pro	Ala	Gly	Gln	Ala	Glu	Pro
145					150					155					160
Asp	Arg	Ala	His	Tyr	Asn	Ile	Val	Thr	Phe	Cys	Cys	Lys	Cys	Asp	Ser
				165					170					175	
Thr	Leu	Arg	Leu	Cys	Val	Gln	Ser	Thr	His	Val	Asp	Ile	Arg	Thr	Leu
			180					185					190		
Glu	Asp	Leu	Leu	Met	Gly	Thr	Leu	Gly	Ile	Val	Cys	Pro	Ile	Cys	Ser

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Gln	Lys	Pro	Thr	Ser	Gly	His	His	His	His	His	His
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<210> 2
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<220>
 <223> Chimaeric protein (protein D from Haemophilus
 influenzae B and E7 from Human papilloma virus type
 16)

<400> 2

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cttgcgtttg	cacaacaggc	tgattatttta	gagcaagatt	tagcaatgac	taaggatggt	180
cgttttagtgg	ttatttcacga	tcactttttta	gatggccttga	ctgatggttg	gaaaaaattc	240
ccacatcgtc	atcgtaaaga	tggccggttac	tatgtcatcg	actttacctt	aaaagaaatt	300
caaagtttag	aaatgacaga	aaactttgaa	accatggcca	tgcattggaga	tacacctaca	360
ttgcatgaat	atatgttaga	tttgcaacca	gagacaactg	atctctactg	ttatgagcaa	420
ttaaatgaca	gctcagagga	ggaggatgaa	atagatgggtc	cagctggaca	agcagaaccg	480
gacagagccc	attacaatat	tgtaaccttt	tggtgcaagt	gtgactctac	gcttcggttg	540
tgcgtacaaa	gcacacacgt	agacattcgt	actttggaag	acctgttaat	gggcacacta	600
ggaattgtgt	gccccatctg	ttctcagaaa	ccaactagt	gccaccatca	ccatcaccat	660
ttaa						663

<210> 3
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 <212> DNA
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<220>
 <223> Chimaeric protein (protein D from Haemophilus
 influenzae B and E6 from Human papilloma virus type
 16)

<400> 3

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cttgcgtttg	cacaacaggc	tgattatttta	gagcaagatt	tagcaatgac	taaggatggt	180
cgttttagtgg	ttatttcacga	tcactttttta	gatggccttga	ctgatggttg	gaaaaaattc	240
ccacatcgtc	atcgtaaaga	tggccggttac	tatgtcatcg	actttacctt	aaaagaaatt	300
caaagtttag	aaatgacaga	aaactttgaa	accatggcca	tgtttcagga	cccacaggag	360
cgaccagaaa	agttaccaca	gttatgcaca	gagctgcaaa	caactataca	tgatataata	420
ttagaatgtg	tgtactgcaa	gcaacagtta	ctgacgacgtg	aggtatatga	ctttgctttt	480
cgggatttat	gcatagtata	tagagatggg	aatccatatg	ctgtatgtga	taaatgttta	540
aagtttttatt	ctaaaattag	tgagtataga	cattattggt	atagtttgta	tggaacaaca	600
ttagaacagc	aatacaacaa	accgttggtg	gatttggttaa	ttaggtgtat	taactgtcaa	660
aagccactgt	gtcctgaaga	aaagcaaaaga	catctggaca	aaaagcaaaag	attccataat	720
ataaggggtc	gggtggaccgg	tcgatgtatg	tcttggttgca	gatcatcaag	aacacgtaga	780
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<210> 4
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 <213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenzae B and E6 from Human papilloma virus type 16)

<400> 4

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 1          5          10          15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
 20          25          30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Ala Asp
 35          40          45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
 50          55          60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
 65          70          75          80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
 85          90          95
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
100          105          110
Ala Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu
115          120          125
Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val
130          135          140
Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe
145          150          155          160
Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Cys
165          170          175
Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr
180          185          190
Cys Tyr Ser Leu Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro
195          200          205
Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys Pro Leu Cys
210          215          220
Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn
225          230          235          240
Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser
245          250          255
Arg Thr Arg Arg Glu Thr Gln Leu Thr Ser Gly His His His His His
260          265          270
His
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<210> 5

<211> 1116

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenzae B and E6E7 fusion from Human papilloma virus type 16)

<400> 5

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cttgcggttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt      180
cgtttagtg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaattc      240
ccacatcgtc atcgtaaaga tggcgcgttac tatgtcatcg actttacctt aaaagaaatt      300
caaagtttag aaatgacaga aaactttgaa accatggcca tgtttcagga cccacaggag      360
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cgacccagaa	agttaccaca	gttatgcaca	gagctgcaaa	caactataca	tgatataata	420
ttagaatgtg	tgtactgcaa	gcaacagtta	ctgcgacgtg	aggtatatga	ctttgctttt	480
cgggatttat	gcatagtata	tagagatggg	aatccatatg	ctgtatgtga	taaagtgtta	540
aagttttatt	ctaaaattag	tgagtataga	cattattggt	atagtttgta	tggaacaaca	600
ttagaacagc	aataacaaca	accgttggtg	gatttggtta	ttaggtgtat	taactgtcaa	660
aagccactgt	gtcctgaaga	aaagcaaaga	catctggaca	aaaagcaaag	attccataat	720
ataaggggtc	ggtggaccgg	tcgatgtatg	tcttggtgca	gatcatcaag	aacacgtaga	780
gaaacccagc	tgatgcatgg	agatacacct	acattgcatg	aatatatggt	agatttgcaa	840
ccagagacaa	ctgatctcta	ctgttatgag	caattaaatg	acagctcaga	ggaggaggat	900
gaaatagatg	gtccagctgg	acaagcagaa	ccggacagag	cccattacaa	tattgtaacc	960
ttttgttgca	agtgtgactc	tacgcttcgg	ttgtgcgtac	aaagcacaca	cgtagacatt	1020
cgtactttgg	aagacctgtt	aatgggcaca	ctaggaattg	tgtgccccat	ctgttctcag	1080
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<210> 6

<211> 371

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenzae B and E6E7 fusion from Human papilloma
virus type 16)

<400> 6

Met	Asp	Pro	Ser	Ser	His	Ser	Ser	Asn	Met	Ala	Asn	Thr	Gln	Met	Lys
1			5					10					15		
Ser	Asp	Lys	Ile	Ile	Ala	His	Arg	Gly	Ala	Ser	Gly	Tyr	Leu	Pro	
			20				25					30			
Glu	His	Thr	Leu	Glu	Ser	Lys	Ala	Leu	Ala	Phe	Ala	Gln	Gln	Ala	Asp
		35				40					45				
Tyr	Leu	Glu	Gln	Asp	Leu	Ala	Met	Thr	Lys	Asp	Gly	Arg	Leu	Val	Val
	50				55					60					
Ile	His	Asp	His	Phe	Leu	Asp	Gly	Leu	Thr	Asp	Val	Ala	Lys	Lys	Phe
65				70					75					80	
Pro	His	Arg	His	Arg	Lys	Asp	Gly	Arg	Tyr	Tyr	Val	Ile	Asp	Phe	Thr
			85					90					95		
Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met
			100					105					110		
Ala	Met	Phe	Gln	Asp	Pro	Gln	Glu	Arg	Pro	Arg	Lys	Leu	Pro	Gln	Leu
		115					120				125				
Cys	Thr	Glu	Leu	Gln	Thr	Thr	Ile	His	Asp	Ile	Ile	Leu	Glu	Cys	Val
	130				135						140				
Tyr	Cys	Lys	Gln	Gln	Leu	Leu	Arg	Arg	Glu	Val	Tyr	Asp	Phe	Ala	Phe
145				150					155						160
Arg	Asp	Leu	Cys	Ile	Val	Tyr	Arg	Asp	Gly	Asn	Pro	Tyr	Ala	Val	Cys
			165					170					175		
Asp	Lys	Cys	Leu	Lys	Phe	Tyr	Ser	Lys	Ile	Ser	Glu	Tyr	Arg	His	Tyr
			180					185					190		
Cys	Tyr	Ser	Leu	Tyr	Gly	Thr	Thr	Leu	Glu	Gln	Gln	Tyr	Asn	Lys	Pro
		195				200					205				
Leu	Cys	Asp	Leu	Leu	Ile	Arg	Cys	Ile	Asn	Cys	Gln	Lys	Pro	Leu	Cys
	210				215						220				
Pro	Glu	Glu	Lys	Gln	Arg	His	Leu	Asp	Lys	Lys	Gln	Arg	Phe	His	Asn
225				230						235					240
Ile	Arg	Gly	Arg	Trp	Thr	Gly	Arg	Cys	Met	Ser	Cys	Cys	Arg	Ser	Ser
			245					250					255		
Arg	Thr	Arg	Arg	Glu	Thr	Gln	Leu	Met	His	Gly	Asp	Thr	Pro	Thr	Leu
			260					265				270			
His	Glu	Tyr	Met	Leu	Asp	Leu	Gln	Pro	Glu	Thr	Thr	Asp	Leu	Tyr	Cys

	275		280		285
Tyr	Glu Gln Leu Asn Asp Ser	Ser Glu Glu Glu Asp	Glu Ile Asp Gly		
290		295	300		
Pro	Ala Gly Gln Ala Glu Pro	Asp Arg Ala His Tyr	Asn Ile Val Thr		
305		310	315		320
Phe	Cys Cys Lys Cys Asp Ser	Thr Leu Arg Leu Cys Val	Gln Ser Thr		
	325	330	335		
His	Val Asp Ile Arg Thr Leu	Glu Asp Leu Leu Met Gly	Thr Leu Gly		
	340	345	350		
Ile	Val Cys Pro Ile Cys Ser	Gln Lys Pro Thr Ser Gly	His His His		
	355	360	365		
His	His His				
370					

<210> 7
 <211> 663
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (protein D from Haemophilus
 influenzae B and mutated E7 from Human papilloma
 virus type 16)

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cttgcgtttg	cacaacaggc tgattatttta gagcaagatt tagcaatgac taaggatggt 180
cgtttagtgg	ttattcacga tcacttttta gatggcttga ctgatgttg gaaaaaattc 240
ccacatcgtc	atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt 300
caaagtttag	aaatgacaga aaactttgaa accatggcca tgcattggaga tacacctaca 360
ttgcatgaat	atatgttaga ttgcaacca gagacaactg atctctacgg ttatcagcaa 420
ttaaattgaca	gctcagagga ggaggatgaa atagatggtc cagctggaca agcagaaccg 480
gacagagccc	attacaatat tgtaaccttt tgttgcaagt gtgactctac gcttcggttg 540
tgcgtacaaa	gcacacacgt agacattcgt actttggaag acctgttaat gggcacacta 600
ggaattgtgt	gccccatctg ttctcagaaa ccaactagt ggcaccatca ccaccacat 660
taa	663

<210> 8
 <211> 220
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (protein D from Haemophilus
 influenzae B and mutated E7 from Human papilloma
 virus type 16)

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	20 25 30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp	
	35 40 45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val	
	50 55 60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe	
65	70 75 80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr	

Met	Leu	Ala	Asp	Arg	Trp	Arg	Lys	His	Thr	Asp	Gly	Asn	Trp	Tyr	Trp
	35						40					45			
Phe	Asp	Asn	Ser	Gly	Glu	Met	Ala	Thr	Gly	Trp	Lys	Lys	Ile	Ala	Asp
	50					55					60				
Lys	Trp	Tyr	Tyr	Phe	Asn	Glu	Glu	Gly	Ala	Met	Lys	Thr	Gly	Trp	Val
65					70					75					80
Lys	Tyr	Lys	Asp	Thr	Trp	Tyr	Tyr	Leu	Asp	Ala	Lys	Glu	Gly	Ala	Met
			85						90					95	
Val	Ser	Asn	Ala	Phe	Ile	Gln	Ser	Ala	Asp	Gly	Thr	Gly	Trp	Tyr	Tyr
		100						105					110		
Leu	Lys	Pro	Asp	Gly	Thr	Leu	Ala	Asp	Arg	Pro	Glu	Leu	Ala	Ser	Met
	115						120					125			
Leu	Asp	Met	Ala	Met	Phe	Gln	Asp	Pro	Gln	Glu	Arg	Pro	Arg	Lys	Leu
	130					135					140				
Pro	Gln	Leu	Cys	Thr	Glu	Leu	Gln	Thr	Thr	Ile	His	Asp	Ile	Ile	Leu
145					150					155					160
Glu	Cys	Val	Tyr	Cys	Lys	Gln	Gln	Leu	Leu	Arg	Arg	Glu	Val	Tyr	Asp
				165					170					175	
Phe	Ala	Phe	Arg	Asp	Leu	Cys	Ile	Val	Tyr	Arg	Asp	Gly	Asn	Pro	Tyr
		180						185					190		
Ala	Val	Cys	Asp	Lys	Cys	Leu	Lys	Phe	Tyr	Ser	Lys	Ile	Ser	Glu	Tyr
	195						200					205			
Arg	His	Tyr	Cys	Tyr	Ser	Leu	Tyr	Gly	Thr	Thr	Leu	Glu	Gln	Gln	Tyr
	210					215					220				
Asn	Lys	Pro	Leu	Cys	Asp	Leu	Leu	Ile	Arg	Cys	Ile	Asn	Cys	Gln	Lys
225					230					235					240
Pro	Leu	Cys	Pro	Glu	Glu	Lys	Gln	Arg	His	Leu	Asp	Lys	Lys	Gln	Arg
				245					250					255	
Phe	His	Asn	Ile	Arg	Gly	Arg	Trp	Thr	Gly	Arg	Cys	Met	Ser	Cys	Cys
		260						265					270		
Arg	Ser	Ser	Arg	Thr	Arg	Arg	Glu	Thr	Gln	Leu	Thr	Ser	Gly	His	His
	275						280					285			
His	His	His	His												
	290														

<210> 11
 <211> 720
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E7 from Human papilloma virus type 16)

<400> 11	
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cacacagacg gcaactggta ctggttcgac aactcaggcg aaatggctac aggctggaag	180
aaaatcgctg ataagtggta ctatttcaac gaagaagggtg ccatgaagac aggctgggtc	240
aagtacaagg acacttggta ctacttagac gctaaagaag gcgccatggt atcaaatgcc	300
tttatccagt cagcggacgg aacaggctgg tactacctca aaccagacgg aacactggca	360
gacaggccag aattggccag catgctggac atggccatgc atggagatac acctacattg	420
catgaatata tgttagattt gcaaccagag acaactgac tctactgtta tgagcaatta	480
aatgacagct cagaggagga ggatgaaata gatgggtccag ctggacaagc agaaccggac	540
agagcccatt acaatattgt aaccttttgt tgcaagtgtg actctacgct tcggttgtgc	600
gtacaaagca cacacgtaga cattcgtagc ttggaagacc tggttaatggg cacactagga	660
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<210> 12

<211> 239
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E7 from Human papilloma virus type 16)

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 Phe Glu Lys Ile Asn Gly Thr Trp Tyr Phe Asp Ser Ser Gly Tyr
 20 25 30
 Met Leu Ala Asp Arg Trp Arg Lys His Thr Asp Gly Asn Trp Tyr Trp
 35 40 45
 Phe Asp Asn Ser Gly Glu Met Ala Thr Gly Trp Lys Lys Ile Ala Asp
 50 55 60
 Lys Trp Tyr Tyr Phe Asn Glu Glu Gly Ala Met Lys Thr Gly Trp Val
 65 70 75 80
 Lys Tyr Lys Asp Thr Trp Tyr Tyr Leu Asp Ala Lys Glu Gly Ala Met
 85 90 95
 Val Ser Asn Ala Phe Ile Gln Ser Ala Asp Gly Thr Gly Trp Tyr Tyr
 100 105 110
 Leu Lys Pro Asp Gly Thr Leu Ala Asp Arg Pro Glu Leu Ala Ser Met
 115 120 125
 Leu Asp Met Ala Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met
 130 135 140
 Leu Asp Leu Gln Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu
 145 150 155 160
 Asn Asp Ser Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln
 165 170 175
 Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys
 180 185 190
 Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile
 195 200 205
 Arg Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro
 210 215 220
 Ile Cys Ser Gln Lys Pro Thr Ser Gly His His His His His His
 225 230 235

<210> 13
 <211> 1173
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E6E7 fusion from Human papilloma virus type 16)

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 cacacagacg gcaactggta ctggttcgac aactcaggcg aaatggctac aggctggaag 180
 aaaatcgctg ataagtggta ctatttcaac gaagaagggtg ccatgaagac aggctgggtc 240
 aagtacaagg acacttggta ctacttagac gctaaagaag gcgccatggt atcaaagtc 300
 tttatccagt cagcggacgg aacaggctgg tactacctca aaccagacgg aacactggca 360
 gacaggccag aattggccag catgctggac atggccatgt ttcaggaccc acaggagcga 420
 cccagaaagt taccacagtt atgcacagag ctgcaaacaa ctatacatga tataatatta 480


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gaatgtgtgt actgcaagca acagttactg cgacgtgagg tatatgactt tgcttttcgg      540
gatttatgca tagtatatag agatgggaat ccatatgctg tatgtgataa atgttttaaag      600
ttttattcta aaattagtga gtatagacat tattgttata gttgtatgg aacaacatta      660
gaacagcaat acaacaaacc gttgtgtgat ttgttaatta ggtgtattaa ctgtcaaaaag      720
ccactgtgtc ctgaagaaaa gcaaagacat ctggacaaaa agcaaagatt ccataatata      780
aggggtcggg ggaccgggctg atgtatgtct tgttgcagat catcaagaac acgtagagaa      840
accagctga tgcattggaga tacacctaca ttgcatgaat atatgttaga tttgcaacca      900
gagacaactg atctctactg ttatgagcaa ttaaattgaca gctcagagga ggaggatgaa      960
atagatgggtc cagctggaca agcagaaccg gacagagccc attacaatat tgtaaccttt    1020
tgttgcaagt gtgactctac gcttcgggtt tgcgtacaaa gcacacacgt agacattcgt    1080
actttggaag acctgttaat gggcacacta ggaattgtgt gccccatctg ttctcagaaa    1140
ccaactagtg gccaccatca ccatcaccat taa                                1173

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<210> 14
<211> 390
<212> PRT
<213> Artificial Sequence

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<220>
<223> Chimaeric protein (Clyta from Streptococcus
      pneumoniae and E6E7 fusion from Human papilloma
      virus type 16)

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<400> 14
Met Lys Gly Gly Ile Val His Ser Asp Gly Ser Tyr Pro Lys Asp Lys
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Phe Glu Lys Ile Asn Gly Thr Trp Tyr Tyr Phe Asp Ser Ser Gly Tyr
      20          25          30
Met Leu Ala Asp Arg Trp Arg Lys His Thr Asp Gly Asn Trp Tyr Trp
      35          40          45
Phe Asp Asn Ser Gly Glu Met Ala Thr Gly Trp Lys Lys Ile Ala Asp
      50          55          60
Lys Trp Tyr Tyr Phe Asn Glu Glu Gly Ala Met Lys Thr Gly Trp Val
      65          70          75          80
Lys Tyr Lys Asp Thr Trp Tyr Tyr Leu Asp Ala Lys Glu Gly Ala Met
      85          90          95
Val Ser Asn Ala Phe Ile Gln Ser Ala Asp Gly Thr Gly Trp Tyr Tyr
      100          105          110
Leu Lys Pro Asp Gly Thr Leu Ala Asp Arg Pro Glu Leu Ala Ser Met
      115          120          125
Leu Asp Met Ala Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu
      130          135          140
Pro Gln Leu Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu
      145          150          155          160
Glu Cys Val Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp
      165          170          175
Phe Ala Phe Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr
      180          185          190
Ala Val Cys Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr
      195          200          205
Arg His Tyr Cys Tyr Ser Leu Tyr Gly Thr Thr Leu Glu Gln Gln Tyr
      210          215          220
Asn Lys Pro Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys
      225          230          235          240
Pro Leu Cys Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg
      245          250          255
Phe His Asn Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys
      260          265          270
Arg Ser Ser Arg Thr Arg Arg Glu Thr Gln Leu Met His Gly Asp Thr
      275          280          285

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Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr Asp
 290 295 300
 Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu
 305 310 315 320
 Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp Arg Ala His Tyr Asn
 325 330 335
 Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val
 340 345 350
 Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu Asp Leu Leu Met Gly
 355 360 365
 Thr Leu Gly Ile Val Cys Pro Ile Cys Ser Gln Lys Pro Thr Ser Gly
 370 375 380
 His His His His His
 385 390

<210> 15
 <211> 684
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (protein D from Haemophilus
 influenzae B and E7 from Human papilloma virus type
 18)

<400> 15
 atggatccaa gcagccattc atcaaatatg gcgaataccc aaatgaaatc agacaaaatc 60
 attattgctc accgtggtgc tagcgggtat ttaccagagc atacgttaga atctaaagca 120
 cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180
 cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaatc 240
 ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt 300
 caaagttag aaatgacaga aaactttgaa accatggcca tgcattggacc taaggcaaca 360
 ttgcaagaca ttgtattgca tttagagccc caaatgaaa ttccggttga ccttctatgt 420
 cacgagcaat taagcgactc agaggaagaa aacgatgaaa tagatgaagt taatcatcaa 480
 catttaccag cccgacgagc cgaaccacaa cgtcacacaa tgttgtgtat gtgttgtaag 540
 tgtgaagcca gaattgagct agtagtagaa agctcagcag acgaccttcg agcattccag 600
 cagctgtttc tgaacacctc gtcctttgtg tgtccgtggg gtgcatccca gcagactagt 660
 ggccaccatc accatcacca ttaa 684

<210> 16
 <211> 227
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (protein D from Haemophilus
 influenzae B and E7 from Human papilloma virus type
 18)

<400> 16
 Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
 1 5 10 15
 Ser Asp Lys Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
 20 25 30
 Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
 35 40 45
 Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
 50 55 60
 Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
 65 70 75 80

caccagcaat taagcgactc agaggaagaa aacgatgaaa tagatggagt taatcatcaa	480
catttaccag cccgacgagc cgaaccacaa cgtcacacaa tgttggtgat gtggtgtaag	540
tgtgaagcca gaattgagct agtagtagaa agctcagcag acgaccttcg agcattccag	600
cagctgtttc tgaacacct gtcctttgtg tgtccgtggt gtgcatccca gcagactagt	660
ggccaccatc accatcacca ttaa	684

<210> 19
 <211> 227
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (protein D from Haemophilus
 influenzae B and mutated E7 from Human papilloma
 virus type 18)

<400> 19															
Met	Asp	Pro	Ser	Ser	His	Ser	Ser	Asn	Met	Ala	Asn	Thr	Gln	Met	Lys
1				5					10					15	
Ser	Asp	Lys	Ile	Ile	Ala	His	Arg	Gly	Ala	Ser	Gly	Tyr	Leu	Pro	
			20				25					30			
Glu	His	Thr	Leu	Glu	Ser	Lys	Ala	Leu	Ala	Phe	Ala	Gln	Gln	Ala	Asp
		35				40					45				
Tyr	Leu	Glu	Gln	Asp	Leu	Ala	Met	Thr	Lys	Asp	Gly	Arg	Leu	Val	Val
	50				55					60					
Ile	His	Asp	His	Phe	Leu	Asp	Gly	Leu	Thr	Asp	Val	Ala	Lys	Lys	Phe
65				70					75					80	
Pro	His	Arg	His	Arg	Lys	Asp	Gly	Arg	Tyr	Tyr	Val	Ile	Asp	Phe	Thr
			85					90					95		
Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met
			100					105					110		
Ala	Met	His	Gly	Pro	Lys	Ala	Thr	Leu	Gln	Asp	Ile	Val	Leu	His	Leu
		115				120						125			
Glu	Pro	Gln	Asn	Glu	Ile	Pro	Val	Asp	Leu	Leu	Gly	His	Gln	Gln	Leu
	130				135						140				
Ser	Asp	Ser	Glu	Glu	Glu	Asn	Asp	Glu	Ile	Asp	Gly	Val	Asn	His	Gln
145				150					155						160
His	Leu	Pro	Ala	Arg	Arg	Ala	Glu	Pro	Gln	Arg	His	Thr	Met	Leu	Cys
			165					170						175	
Met	Cys	Cys	Lys	Cys	Glu	Ala	Arg	Ile	Glu	Leu	Val	Val	Glu	Ser	Ser
			180				185						190		
Ala	Asp	Asp	Leu	Arg	Ala	Phe	Gln	Gln	Leu	Phe	Leu	Asn	Thr	Leu	Ser
	195					200						205			
Phe	Val	Cys	Pro	Trp	Cys	Ala	Ser	Gln	Gln	Thr	Ser	Gly	His	His	His
210				215							220				
His	His	His													
225															

<210> 20
 <211> 837
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (protein D from Haemophilus
 influenzae virus B and E6 from Human papilloma
 virus type 18)

atggatccaa gcagccattc atcaaatatg gcgaataccc aaatgaaatc agacaaaatc	60
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attattgctc accgtggtgc tagcgggttat ttaccagagc atacgttaga atctaaagca 120
cttgcggtttg cacaacaggc tgattatttta gagcaagatt tagcaatgac taaggatggt 180
cgtttagtggt ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaattc 240
ccacatcgtc atcgtaaaga tggccggttac tatgtcatcg actttacctt aaaagaaatt 300
caaagtttag aaatgacaga aaactttgaa accatggcgc gctttgagga tccaacacgg 360
cgaccctaca agctacctga tctgtgcacg gaactgaaca cttcactgca agacatagaa 420
ataacctgtg tatattgcaa gacagtattg gaacttacag aggtatttga atttgcattt 480
aaagatttat ttgtggtgta tagagacagt ataccgcatg ctgcatgcca taaatgtata 540
gattttttatt ctagaattag agaattaaga cattattcag actctgtgta tggagacaca 600
ttggaaaaaac taactaacac tgggtttatac aattttattaa taagggtgcct gcggtgccag 660
aaaccgttga atccagcaga aaaacttaga caccttaatg aaaaacgacg atttcacaac 720
atagctgggc actatagagg ccagtgccat tcgtgctgca accgagcacg acaggaacga 780
ctccaacgac gcagagaaac acaagtaact agtggccacc atcaccatca ccattaa 837

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<210> 21
<211> 278
<212> PRT
<213> Artificial Sequence

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<220>
<223> Chimaeric protein (protein D from Haemophilus
      influenzae B and E6 from Human papilloma virus type
      18)

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<400> 21
Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
1      5      10      15
Ser Asp Lys Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
20     25     30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
35     40     45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
50     55     60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
65     70     75     80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
85     90     95
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
100    105    110
Ala Arg Phe Glu Asp Pro Thr Arg Arg Pro Tyr Lys Leu Pro Asp Leu
115    120    125
Cys Thr Glu Leu Asn Thr Ser Leu Gln Asp Ile Glu Ile Thr Cys Val
130    135    140
Tyr Cys Lys Thr Val Leu Glu Leu Thr Glu Val Phe Glu Phe Ala Phe
145    150    155    160
Lys Asp Leu Phe Val Val Tyr Arg Asp Ser Ile Pro His Ala Ala Cys
165    170    175
His Lys Cys Ile Asp Phe Tyr Ser Arg Ile Arg Glu Leu Arg His Tyr
180    185    190
Ser Asp Ser Val Tyr Gly Asp Thr Leu Glu Lys Leu Thr Asn Thr Gly
195    200    205
Leu Tyr Asn Leu Leu Ile Arg Cys Leu Arg Cys Gln Lys Pro Leu Asn
210    215    220
Pro Ala Glu Lys Leu Arg His Leu Asn Glu Lys Arg Arg Phe His Asn
225    230    235    240
Ile Ala Gly His Tyr Arg Gly Gln Cys His Ser Cys Cys Asn Arg Ala
245    250    255
Arg Gln Glu Arg Leu Gln Arg Arg Arg Glu Thr Gln Val Thr Ser Gly
260    265    270
His His His His His His

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275

<210> 22
<211> 1152
<212> DNA
<213> Artificial Sequence

<220>
<223> Chimaeric protein (protein D from Haemophilus
influenzae B and E6E7 fusion from Human papilloma
virus type 18)

<400> 22
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attattgctc accgtggtgc tagcgggttat ttaccagagc atacgttaga atctaaagca 120
cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180
cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaattc 240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt 300
caaagtttag aaatgacaga aaactttgaa accatggcgc gctttgagga tccaacacgg 360
cgaccctaca agctacctga tctgtgcacg gaactgaaca cttcactgca agacatagaa 420
ataacctgtg tatattgcaa gacagtattg gaacttacag aggtatttga atttgcattt 480
aaagatttat ttgtggtgta tagagacagt ataccgcatg ctgcatgcca taaatgtata 540
gattttttatt ctagaattag agaattaaga cattattcag actctgtgta tggagacaca 600
ttggaaaaac taactaacac tgggtttatac aattttattaa taagggtgcct gcggtgccag 660
aaaccgttga atccagcaga aaaacttaga caccttaatg aaaaacgacg atttcacaac 720
atagctgggc actatagagg ccagtgccat tcgtgctgca accgagcacg acaggaacga 780
ctccaacgac gcagagaaac acaagtaatg catggaccta aggcaacatt gcaagacatt 840
gtattgcatt tagagcccca aaatgaaatt ccggttgacc ttctatgtca cgagcaatta 900
agcgactcag aggaagaaaa cgatgaaata gatggagtta atcatcaaca ttaccagcc 960
cgacgagccg aaccacaacg tcacacaatg ttgtgtatgt gttgtaagtg tgaagccaga 1020
attgagctag tagtagaaag ctcagcagac gaccttcgag cattccagca gctgtttctg 1080
aacaccctgt cctttgtgtg tccgtggtgt gcatcccagc agactagtgg ccaccatcac 1140
catcaccatt aa 1152

<210> 23
<211> 383
<212> PRT
<213> Artificial Sequence

<220>
<223> Chimaeric protein (protein D from Haemophilus
influenzae B and E6E7 fusion from Human papilloma
virus type 18)

<400> 23
Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
1 5 10 15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
20 25 30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Ala Asp
35 40 45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
50 55 60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
65 70 75 80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
85 90 95
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
100 105 110
Ala Arg Phe Glu Asp Pro Thr Arg Arg Pro Tyr Lys Leu Pro Asp Leu

<220>
<223> Synthetic

<400> 26
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30

<210> 27
<211> 6
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic

<400> 27
rrcgyy

6

<210> 28
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> E.coli

<400> 28
Thr Ser Gly His His His His His His
1 5